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## WEST NATIONAL TECHNICAL CENTER

HAWAII

SOIL CONSERVATION SERVICE

## GLOSSARY OF SELECTED

WASHINGTON

MONTANA

## GEOMORPHIC TERMS

OREGON

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WYOMING

## FOR WESTERN SOIL SURVEYS

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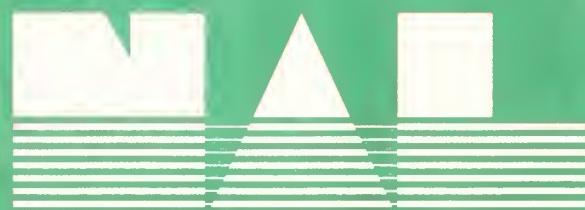
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Glossary of Selected Geomorphic  
Terms for Western Soil Surveys

West National Technical Center  
Soil Conservation Service  
Portland, Oregon



United States  
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Soil  
Conservation  
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Standardization of earth science terminology for western soil surveys is important in clearly presenting the occurrence of soils. Terms have been used incorrectly or without reasonable means of verification.

Soil scientists in the West are encouraged to limit the terminology for soil science, geology, and geomorphology in soil series and map unit descriptions to those terms that appear in the Soil Science Society of America Glossary, in American Geological Institute Glossary, in a Webster's Dictionary, or in the enclosed "Glossary of Selected Geomorphic Terms" developed by Drs. Parsons and Hawley. Any term not found in a standard reference should be defined in the manuscript glossary.

Landform terminology should be consistent among the official series, series for the soil survey manuscript, mapping units, and general soil map descriptions and legend, and also in any discussion of the series in the genesis section or other technical articles of the Soil Survey.



GEORGE C. BLUHM  
Director



The Soil Conservation Service  
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Department of Agriculture

SCS-AS-1  
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INTRODUCTION TO GLOSSARY OF SELECTED GEOMORPHIC TERMS  
FOR WESTERN SOIL SURVEYS

Attached is revision 2 of the glossary of selected geomorphic terms prepared for the Cooperative Soil Survey in the Western States.

Lithologic and mineralogic terms have not been included in this glossary largely due to the tremendous number of terms involved and the necessarily arbitrary selections that would be necessary. Most users of this glossary probably have access to books that contain most lithologic terms.

In 1964 Clifford A. Balster, Areal Geologist for the Willamette Valley soil-geomorphology project, recognized the need for a geomorphic glossary for soil surveys and began a detailed compilation of terms. Parsons in 1974 developed a brief glossary for the Pacific Northwest. Hawley initiated earlier versions of the present glossary; Parsons made the additions and changes for this revision. Therefore, this expanded glossary is the result of over 20 years of field sessions with soil survey staff in the West.

In selecting terms for definition we reviewed pertinent items in recent soil survey manuscripts, the 1976 edition of the SCSA Resource Conservation Glossary, the SSSA Glossary of Soil Science Terms, and the American Geological Institute Glossary (see 1980 edition by Bates and Jackson). To this basic list were added terms that are commonly used in current geologic, physical geographic, and soil-geomorphic literature. Some of this terminology has been developed or refined during the course of the four major SCS Soil-Geomorphology Projects in Iowa, New Mexico, North Carolina, and Oregon. The glossary is designed primarily for use during the course of a soil survey, especially as an aid in literature review and geologic map interpretation early in the survey.

There are three major categories of terms: (1) landforms, (2) geomorphic processes, and (3) earth materials. Definitions of geomorphic terms are commonly long and complex because abstract genetic as well as concrete physical and chemical attributes are usually involved. For example, asymmetric ridges produced by differential erosion of gently dipping, resistant and weak strata are termed "cuestas." Identical topographic features comprising tilted fault blocks are not cuestas. As in the case of Soil Taxonomy, many definitions contain words with special meanings given elsewhere in the glossary. Thus, a considerable amount of cross referencing is required.

Finally, certain types of terminology are much too complex for clear presentation in a glossary. Works listed in the attached bibliography should be consulted for basic earth science information. General landform and geomorphic process information is well presented by Bloom (1978), Fairbridge (1968), Hunt (1974), Ritter (1978), Schumm (1977), and Thornbury (1965, 1969).

Special geomorphic processes and products are covered by Cooke and Warren (1973), Flint (1971) and Wyllie (1976). The best textbooks on soil-geomorphic relationships are by Birkeland (1974) and Ruhe (1975). Soil Survey Investigations Project Reports by Balster, Daniels, Gamble, Gile, Hawley, Parsons, Ruhe, and associates are the best source of information on this subject. Techniques of field geology, including clear explanations of field classifications of igneous and metamorphic rocks, are presented by Compton (1962). Pettijohn (1975) should be consulted for up-to-date information on sedimentary and pyroclastic rocks. Recently published introductory geology texts by Compton (1977), Hamblin (1975), and Hamblin and Howard (1980) are highly recommended. Finally the 1975 American Geological Institute Data Sheet edition provides very useful summaries of geologic information (eg. rock classification and composition) that can be inserted in field notebooks. All books listed should be obtained for SCS State Office libraries, and within-state circulation. Asterisks denote books that are useful in field office libraries.

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aa

A type of lava flow having a rough, fragmental surface.

ablation till

Loose permeable till deposited during the final downwasting of nearly static glacial ice. Lenses of crudely sorted sand and gravel are common. (cf. glacial till, moraine)

active slope

A hill or mountain slope that is responding to valley incision, with erosion (either geologic or accelerated) exceeding regolith weathering, and that has detritus accumulated behind obstructions indicating contemporary transport of slope alluvium. Slope gradients usually exceed 45 percent. (cf. metastable slope)

alluvial

Pertaining to material or processes associated with transportation or deposition by running water.

alluvial cone

The material washed down mountain and hill slopes by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep conical mass descending equally in all directions from the point of issue.

alluvial fan

A dynamic body of alluvium, with or without debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a plain. Common longitudinal profiles are gently sloping and nearly linear. Source uplands range in relief and areal extent from mountains and plateaus to gullied terrains on hill and piedmont slopes.

alluvial terrace

(cf. stream terrace)

alluvium

Unconsolidated clastic material deposited by running water, including gravel, sand, silt, clay and various mixtures of these.

anticline

A unit of folded strata that is convex upward. In a single anticline beds forming the opposing limbs of the fold dip away from its axial plane. (cf. syncline, monocline)

arête

A narrow, jagged mountain crest, often above the snowline, sculptured by alpine glaciers and formed by backward erosion of adjoining cirque walls.

arroyo

(cf. wash)

ash (volcanic)

Fine pyroclastic material under 4.0 mm diameter; in Soil Taxonomy ash is less than 2.0 mm.

atoll

A ring-shaped coral reef; a low roughly circular coral island or ring of closely spaced coral islands encircling a shallow lagoon.

avulsion

A sudden cutting off or separation of land by a flood or by an abrupt change in the course of a stream, as by a stream breaking through a meander.

backslope (hillslope)

The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes (e.g., valley side, ridge side). Backslopes in profile are commonly steep, linear, and may or may not include cliff segments, also called "gravity slopes" or "free faces." The term "mid-slope" may be used to designate an element without a cliff. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water. NOTE: Structural geomorphologists may use the term as a synonym of dipslope in describing homoclinal ridges (e.g., cuesta "backslope"). (cf. footslope, shoulder)

backswamp (flood-plain landform)

Extensive, marshy, depressed areas of flood plains between the natural levee borders of channel belts and valley sides or terraces. (cf. valley flat)

badlands

Rough, narrowly and steeply gullied topography in arid or semiarid topography largely devoid of vegetation.

bajada

(cf. coalesced fan piedmont)

bar and channel

The microrelief common to flood plains and relatively young alluvial terraces. With time the microrelief becomes subdued as the higher lying bars erode into the channels. The ridge-like bars often consist of accumulations of coarse sediment, while the channels are finer textured. The relief between bar and channel is largely related to the competence of the stream.

barbed drainage pattern

A drainage pattern produced by tributaries that join the main stream in sharp "boathook" bends that point upstream; it is usually the result of stream piracy that has effected a reversal of flow of the main stream.

barrier beach

A single, elongate, narrow sand ridge rising slightly above the high-tide level and extending generally parallel with the shore, but separated from it by a lagoon or marsh. (cf. foredune)

basal till

Compact till, commonly clay rich, deposited beneath a moving glacier. Lodgement till is a variety characterized by dense fissile structure and stones oriented with long axes roughly parallel to direction of ice movement. (cf. glacial till)

base level

The theoretical limit or lowest level toward which erosion of the earth's surface constantly progresses but seldom, if ever, reaches; especially the level below which a stream cannot erode its bed. The ultimate base level for the land surface is sea level, but temporary base levels may exist locally. The base level of eolian erosion may be above or below sea level; that of marine erosion is the lowest level to which marine agents can cut a bottom.

**basin (intermontane)**

A broad structural lowland, commonly elongated and many miles across, between mountain ranges. Major component landforms are basin floors and piedmont slopes. Floors of internally-drained basins (bolsons) contain one or more closed depressions, with temporary lakes (playas), and alluvial plains. In basins with through drainage (semi-bolsons), alluvial plains are dominant and lakes are absent or of small extent. Piedmont slopes comprise erosional surfaces (pediments) of individual and/or coalescent alluvial fans. (cf. valley)

**basin floor**

A general term for the nearly level to gently sloping, bottom surface of an intermontane basin (bolson). Component landforms include playas, broad alluvial flats containing ephemeral drainageways, and relict alluvial and lacustrine surfaces that rarely if ever are subject to flooding. Where through-drainage systems are well developed alluvial plains are dominant and lake plains are absent or of limited extent. Basin floors grade mountainward to distal parts of piedmont slopes.

**beach**

The unconsolidated material that covers a gently sloping zone, typically with a concave profile, extending landward from the low-water line to the place where there is a definite change in material or physiographic form or to the line of permanent vegetation; the relatively thick and temporary accumulation of loose water-borne material that is in active transit along, or deposited on, the shore zone between the limits of low water and high water.

**beaded drainage**

A pattern of short, minor streams connecting small lakes characteristic of areas underlain by permafrost.

**bedrock**

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface. (cf. regolith)

**bench**

(cf. structural bench)

**blowout**

A saucer- or trough-shaped depression or basin formed by wind erosion of a preexisting dune or other sand deposit.

**bog**

Waterlogged, spongy ground, consisting primarily of mosses, containing acidic, decaying vegetation such as sphagnum, sedges, and heaths, that develops into peat. (cf. swamp)

**bolson**

An internally drained (closed), intermontane basin with two major land-form components: basin floor and piedmont slope. The former includes nearly level alluvial plains and playa-lake depressions. The latter comprises slopes of erosional origin adjoining the mountain fronts (pediments) and complex constructional surfaces (bajadas) mainly composed of individual and/or coalescent alluvial fans. (regional term Southwest)

**braided channel or stream**

A channel or stream with multiple channels that interweave as a result of repeated bifurcation and convergence of flow around interchannel bars, resembling in plan the strands of a complex braid. Braiding is generally confined to broad, shallow streams of low sinuosity, high bedload non-cohesive bank material, and steep gradient. At a given bank-full discharge braided streams have steeper slopes, and shallower, broader and less stable channel cross sections than meandering streams. (cf. flood plain landforms)

**breaks**

The steep to very steep broken land at the border of an upland summit that is dissected by ravines.

**buried**

Pertaining to paleosols, landforms, and geomorphic surfaces covered by a mantle of geologic material (e.g., sedimentary or volcanic).

**butte**

An isolated, usually flat-topped upland mass characterized by summit widths that are less than heights of bounding erosional scarps. An upland type produced by differential erosion of nearly horizontal, interbedded weak and resistant rocks, with the latter comprising caprock layers. As summit

area increases relative to height, buttes are transitional to mesas. (cf. plateau, cuesta)

caldera

A large, basin-shaped volcanic depression, more or less circular in form, the diameter of which is many times greater than that of the vent(s), regardless of wall steepness.

canyon

A long, deep, narrow, very steep-sided valley with high and precipitous walls in an area of high local relief (e.g., mountain or high plateau terrain).

cape

An extensive, somewhat rounded irregularity of land jutting out from the coast into a large body of water; generally more prominent than a point. (Syn. headland)

catsteps

(cf. terracettes)

cinder cone

A conical hill formed by the accumulation of volcanic ejecta, with slopes usually steeper than 20 percent.

cirque

Semicircular, concave, bowl-like areas with steep faces primarily resulting from glacial ice and snow abrasion.

clast

An individual constituent, grain, or fragment of sediment or rock, produced by the mechanical weathering (disintegration) of a larger rock mass.

clastic

Rock fragments or sediment composed mainly of derived from preexisting rocks or minerals and moved from their place of origin. (cf. detritus, epiclastic, pyroclastic)

cliff

A high, very steep to perpendicular or overhanging slope; a precipice.

coalescent fan piedmont

A broad, gently-inclined, piedmont slope formed by lateral coalescence of a series of alluvial fans, and having a broadly undulating transverse profile (parallel to the mountain front) due to the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins in the southwest U.S.A.

col

A narrow, sharp-edged pass or saddle in a mountain range between two adjacent peaks. The highest point of a divide between two valleys.

colluvium

Unconsolidated earth material deposited on and at the base of steep slopes by mass wasting (direct gravitational action) and local unconcentrated runoff.

congeliturbate

Unconsolidated earth material moved or disturbed by frost action.

constructional (geomorph.)

Owing its origin, form, position or general character to depositional (aggradational) processes, such as accumulation of sediment to form an alluvial fan or terrace. (cf. erosional)

coppice dune

A small mound of fine-grained desert material stabilized around shrubs.

coulee

A term applied in the Pacific NW to a dry or intermittent stream valley or wash; esp. a long, steep-walled gorge representing a Pleistocene overflow channel that carried meltwater from an ice sheet.

cradle knoll

A microrelief term for earth that is raised by an uprooted tree.

creep

Slow mass movement of earth material down relatively steep slopes, primarily under influence of gravity but facilitated by saturation with water and frost action.

cuesta

An asymmetric, homoclinal ridge capped by resistant rock layers of slight to moderate dip ( $<10^\circ$ ,  $<16\%$ ); produced by differential erosion of interbedded resistant and weak rocks. A long, gently sloping to sloping face (dipslope) roughly paralleling the inclined beds, opposes a relatively short and steep (scarp) face cut across the tilted rocks. (cf. hogback, mesa)

debris

Any surficial accumulation of loose material detached from rock masses by chemical and mechanical means, as by decay and disintegration, and occurring in the place where it was formed, or transported by water or ice and redeposited. It consists of rock fragments, finer-grained earth material, and sometimes organic matter.

debris flow (mudflow)

A mass movement process involving rapid flowage of highly viscous mixtures of debris, water, and entrapped air. Water content may range up to 60%. A mudflow is a type of debris flow with clastic particles of sand size and finer. (cf. alluvial fan)

delta

A body of alluvium, whose surface form is nearly flat and fan-shaped, deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, usually a sea or lake.

dendritic drainage pattern

A drainage pattern in which the streams branch irregularly in all directions and at almost any angle, resembling in plan the branching habit of certain trees, such as oaks or maples, and produced where the master stream receives several tributaries of successively lower stream order. It is indicative of streams flowing across horizontal and homogeneous strata or crystalline rocks that offer uniform resistance to erosion.

desert pavement

A layer of gravel or coarser fragments on desert soil surfaces that (1) was emplaced by upward movement of fragments from underlying sediments, or (2) formed as a lag concentrate after finer particles have been removed by running water or wind (i.e., a variety of erosion pavement).

detritus

Rock and mineral fragments occurring in sediments that were derived from pre-existing igneous, sedimentary, or metamorphic rocks and moved from its place of origin.

dipslope

A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rocks; for example, the long, gently inclined surface of a cuesta. (syn. structural backslope; cf. scarp slope)

dome

A smoothly rounded rock-capped mountain summit.

draw

A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact glacial till that may or may not have a core of bedrock or stratified glacial drift. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline flow of glaciers which molded the subglacial floor through a combination of erosion and deposition.

dune

A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

dune (barchan)

A crescent-shaped dune with tips extending to the leeward, making this side concave in plan and the windward side convex. Barchan dunes tend to be arranged in chains extending in the direction of the most effective wind.

dune (parna)

A dune largely composed of sand-size aggregates of clay.

dune (seif)

A longitudinal dune about six times as wide as it is high and oriented parallel, rather than transverse, to the prevailing wind.

eolian

Material transported and deposited by the wind. Includes earth materials ranging from dune sands to silty loess deposits and volcanic ash.

ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is at all times above the water table. (cf. arroyo, intermittent stream)

epiclastic

Any clastic rock or sediment other than pyroclastic. Constituent fragments are derived by weathering and erosion rather than by direct volcanic processes. (cf. volcaniclastic)

erosion

The wearing away of the land surface by running water, waves, moving ice or wind, or by such processes as mass wasting and corrosion (solution and other chemical processes). The term "geologic erosion" refers to natural processes occurring over long (geologic) time spans.

erosional (geomorph.)

Owing its origin, form, position or general character to wearing-down (degradational) processes, such as removal of weathered rock debris by any

mechanical or chemical processes to form, for example, a pediment or valley-side slope. (cf. constructional)

erosion pavement

A concentration of gravel or coarser fragments that remains on the soil surface as a lag after finer particles have been removed by running water or wind. (cf. stone line, desert pavement)

erratic

A rock fragment of a different lithology from the bedrock which it overlies, either as a discrete entity or as part of a sediment that has been transported, sometimes for a considerable distance, from its place of origin.

escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. The term is more often applied to cliffs produced by differential erosion and it is commonly used synonymously with "scarp."

esker

A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that was deposited by a subsurface stream flowing between ice walls or in an ice tunnel of a retreating glacier, and was left behind when the ice melted. Eskers range in length from less than a kilometer to more than 160 km, and in height from 3 to 30 m. (cf. glaciofluvial deposits)

eustatic

Pertaining to worldwide changes of sea level that affect all the oceans. Eustatic changes in the last few million years were caused by additions or removal of water from the continental icecaps. (eustacy n.)

exhumed

Formerly buried landforms, geomorphic surfaces or paleosols that have been re-exposed at the ground surface by erosion of the covering mantle. (cf. relict)

faceted spur

The end of a ridge that has been truncated or steeply beveled by stream erosion, glaciation, or faulting.

### **facies (stratigraphy)**

The sum of all primary lithologic and paleontologic characteristics exhibited by a sedimentary rock and from which its origin and environment of formation may be inferred; the general nature or appearance of a sedimentary rock produced under a given set of conditions; a distinctive group of characteristics that distinguishes one group from another within a stratigraphic unit. (e.g., contrasting river-channel facies and overbank-flood-plain facies in alluvial valley fills)

### **fanhead**

The area on an alluvial fan close to its apex.

### **fan terrace**

A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces. An abandoned former fan surface.

### **fault**

A fracture or fracture zone of the earth with displacement along one side in respect to the other.

### **flood plain**

The nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

### **flood-plain landforms**

A variety of constructional and erosional features produced by stream channel migration and flooding. (e.g., backswamps, braided channels and streams, flood plain splays, meander, meander belt, meander scrolls, oxbow lakes, natural levees, and valley flats.)

### **flood-plain splay**

(cf. meander belt)

**fluvial**

Of or pertaining to rivers; produced by river action, as a fluvial plain.

**foothills**

A steeply sloping upland with hill relief (up to 1000 ft, 300 m) that fringes a mountain range or high-plateau escarpment. (cf. hill, mountain, plateau)

**footslope**

The geomorphic component that forms the inner gently inclined surface at the base of a hillslope. The surface profile is dominantly concave; and in terms of gradational processes, it is a transition zone between upslope sites of erosion (backslope) and downslope sites of deposition (toeslope). (cf. hillslope)

**foredune**

A coastal dune oriented parallel to the shoreline of an ocean or large lake, occurring at the landward margin of the beach, and more or less stabilized by vegetation.

**formation (stratigraphy)**

The basic rock-stratigraphic unit in the local classification of rocks. A body of rock (commonly a sedimentary stratum or strata, but also igneous and metamorphic rocks) generally characterized by some degree of internal lithologic homogeneity or distinctive lithologic features (such as chemical composition, structures, textures, or general kind of fossils), by a prevailing (but not necessarily tabular) shape, and by mappability at the earth's surface (at scales of the order of 1:25,000) or traceability in the subsurface.

**frost polygons**

(cf. patterned ground)

**geomorphology**

The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and of the history of geologic changes as recorded by these surface features.

### geomorphic surface

A geomorphic surface represents an episode of landscape development and consists of one or more landforms (Balster and Parsons). A mappable part of the land surface that is defined in terms of morphology (relief, slope, aspect, etc.), origin (erosional, constructional, etc.), age (absolute, relative), and stability of component landforms. (cf. buried, exhumed, relict)

### gilgai

The microrelief of heavy clay soils with high coefficients of expansion and contraction according to changes in moisture.

### glacial drift

All rock material transported and deposited by glacial ice and meltwater; includes glacial till, glaciofluvial (outwash), and glaciolacustrine deposits from alpine, piedmont, or continental glaciers.

### glacial outwash

Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Outwash deposits may occur in the form of valley fills (valley trains and/or outwash terraces) or as widespread outwash plains. (cf. glacial drift, glaciofluvial deposits)

### glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, valley trains, and deltas, kames, eskers, and kame terraces. (cf. glacial drift and glacial outwash)

### glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are bedded or laminated with varves.

### glacial till

Unsorted and unstratified glacial drift, generally unconsolidated, deposited directly by a glacier without subsequent reworking by water from the glacier, and consisting of a heterogeneous mixture of clay, sand, gravel,

and boulders varying widely in size and shape. (cf. ablation till, basal till)

gulch

A small stream channel, narrow and steepled in cross section, and larger than a gully. (Regional term - western U.S.A.; general syn. ravine; cf. draw)

gully

A very small channel with steep sides cut by running water and through which water ordinarily runs only after a rain or ice or snow melt. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. (cf. gulch, arroyo, wash, draw)

hanging valley

An elevated valley, above the main drainage system, which is separated by a knickpoint and represents a second-cycle or relict valley.

hill

A natural elevation of the land surface, rising as much as 1,000 ft (300 m) above surrounding lowlands, usually of restricted summit area (relative to a tableland) and having a well-defined outline; hill slopes generally exceed 15%. The distinction between a hill and a mountain is often dependent on local usage. (cf. foothills)

hillslope

The steeper part of a hill between its summit and the drainage line, valley flat or depression floor at the base of the hill. In descending order geomorphic components of a simple hillslope may include shoulder, backslope, footslope and toeslope. However, all of these components are not necessarily present in any given hillslope continuum. In addition, complex hillslopes may include two or more backslope to toeslope sequences.

hogback

A sharp-crested, symmetric (homoclinal) ridge formed by highly tilted resistant rock layers; produced by differential erosion of interlayered resistant and weak rocks with dips greater than about 25° (45%). (cf. cuesta)

Holocene

The second epoch of the Quaternary Period of geologic time, extending from the end of the Pleistocene Epoch (about 10 thousand years ago) to the present; also the corresponding (time-stratigraphic) "series" of earth materials. (syn. post-glacial, Recent)

homoclinal (structural geomorph.)

Pertaining to strata that dip in one direction with a uniform angle. (cf. cuesta, hogback)

hummock

A rounded or conical mound or knoll; a slight rise of ground above a level surface.

igneous rock

Rock formed by solidification from a molten or partially molten state; major varieties include plutonic and volcanic rocks. (cf. intrusive, extrusive; Examples: andesite, basalt, granite)

inselberg

A prominent, isolated, steep-sided, usually smoothed and rounded, residual hill or small mountain rising abruptly from an extensive lowland in a hot, dry region.

interdune

The relatively flat surface between dunes; the long, trough-like passage between parallel longitudinal (seif) dunes.

intermittent stream

A stream, or reach of a stream, that flows for protracted periods only when it receives ground-water discharge or long-continued contributions from melting snow or other surface and shallow subsurface sources. (cf. ephemeral stream)

jokulhlaup

An Icelandic term for a glacial outburst flood; esp. when an ice dam impounding a glacial lake breaks. Such breaks drained glacial Lake Missoula

and created the Channeled Scablands in the Pacific NW.  
Pron: yo-kool-loup (the last syllable as in "out").

kame

A moundlike hill of ice-contact glacial drift, composed chiefly of stratified sand and gravel.

kame terrace

A terrace-like ridge consisting of stratified sand and gravel (1) deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine, and (2) left standing after the disappearance of the ice. It is commonly pitted with "kettles" and has an irregular ice-contact slope.

karst

A type of topography that is characterized by closed depressions or sinkholes, and is dependent upon underground solution and the diversion of surface waters to underground routes. It is formed over limestone, dolomite, gypsum and other soluble rocks as a result of differential solution of these materials and associated processes of subsurface drainage, cave formation, subsidence, and collapse.

kettle

A steep-sided, bowl-shaped depression without surface drainage in glacial drift deposits and believed to have formed by the melting of a large, detached block of stagnant ice buried in the glacial drift.

knickpoint

Any interruption or break in slope; a point of abrupt inflection in the longitudinal profile of a stream or of its valley.

knoll

A small, low, rounded hill rising above adjacent landforms. (syn. hillock, knob)

lacustrine deposit

Clastic sediments and chemical precipitates originally deposited in lakes.

### lahar

A mudflow composed chiefly of volcaniclastic materials on the flank of a volcano. The debris carried in the flow includes pyroclastic material, blocks from primary lava flows, and epiclastic material.

### lamination (lamina)

A sedimentary layer less than 1 centimeter thick.

### landform

Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes; it includes major forms such as a plain, plateau, or mountain, and minor forms such as a hill, valley, slope, esker, or dune. Taken together, the landforms make up the surface configuration of the earth. The "landform" concept involves both empirical description of a terrain (land-surface form) class and interpretation of genetic factors ("natural causes").

### landscape

(Gen.) All the natural features, such as fields, hills, forests, and water that distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all of its natural characteristics. (Geol.) The distinct association of landforms, esp. as modified by geologic forces, that can be seen in a single view.

### landslide

A mass-wasting process, and the landform produced, involving moderately rapid to rapid (greater than one foot per year) downslope transport, by means of gravitational stresses, of a mass of rock and regolith that may or may not be water saturated.

### land-surface form

The description of a given terrain unit based on empirical analysis of the land surface rather than interpretation of genetic factors. Surface form may be expressed quantitatively in terms of vertical and planimetric slope-class distribution, local and absolute relief, and patterns of terrain features such as interfluve crests, drainage lines, or escarpments.

levee

(cf. meander belt)

lithification

The conversion of a newly deposited, unconsolidated sediment into a coherent and solid rock, involving processes such as cementation, compaction; desiccation, crystallization, recrystallization, and compression. It may occur concurrent with, or shortly or long after deposition.

lithologic

Pertaining to the physical character of a rock.

loess

Fine-grained wind-deposited material, dominantly of silt-size.

louderback

A remnant of a lava flow appearing in a tilted fault block and bounded by a dip slope. The flow then acts as a rimrock.

mass wasting (mass movement)

Dislodgement and downslope transport of earth (regolith and rock) material as a unit under direct gravitational stress. The process includes slow displacements such as creep, and solifluction, and rapid movements such as landslides, rock slides and falls, earthflows, debris flows, and avalanches. Agents of fluid transport (water, ice, air) may play a subordinate role in the process.

meander, meandering channel (flood-plain landforms)

A meander is one of a series of sinuous loops, with sine-wave form, in the course of a stream channel. The term "meandering" should be restricted to loops with channel length more than 1.5 to 2 times the length of the wave form. Meandering stream channels commonly have cross sections with low width to depth ratios, (fine-grained) cohesive bank materials, and low gradient. At a given bank-full discharge meandering streams have gentler slopes, and deeper, narrower and more stable channel cross-sections than braided streams. (cf. flood-plain landforms)

### meander belt (flood-plain landforms)

The bottomland zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangentially to the outer bends of active channel loops. Landform components of the meander-belt surface are produced by a combination of gradual (lateral and down-valley) migration of meander loops and evulsive channel shifts causing abrupt cut-offs of loop segments. Forms flanking the sinuous stream channel include: point bars made up of one or more low, arcuate bar ridges and intervening swales that form by accretion of bed and suspended load on the convex banks of loops; and scars of abandoned meanders and flanking point bars. Sandy to gravelly bed load materials form the bulk of point bar deposits, and individual ridge-swale pairs are termed meander scrolls. Oxbow lakes are flooded segments of abandoned meander loops within which fine-grained suspended- load material accumulates over coarser channel deposits. During flood stages when a stream overtops its banks and spreads out over adjacent flood-plain areas, flow velocities are reduced and coarser fractions of the sediment load are commonly deposited close to the channel. Natural levees are wedge-shaped deposits of coarsest suspended-load material that form long, low ridges on channel banks and slope gently away from the stream. Flood-plain splays are small alluvial fans formed where the flooding stream breaks through a levee (natural or artificial) and deposits the coarser part of its load on the adjacent flood plain (e.g., backswamp or valley-flat surfaces). Many meander belts do not exhibit prominent natural levee or splay forms. Flood plains of broad alluvial valleys may contain one or more abandoned meander belts in addition to the zone flanking the active stream channel.

### meander scroll

(cf. meander belt)

### mesa

A broad, nearly flat-topped and usually isolated upland mass characterized by summit widths that are greater than the heights of bounding erosional escarpments. A tableland produced by differential erosion of nearly horizontal, interbedded weak and resistant rocks, with the latter comprising caprock layers. As summit area decreases relative to height mesas are transitional to buttes. In the western states mesa is also commonly used to designate broad structural benches and alluvial terraces that occupy intermediate levels in stepped sequences of platforms bordering canyons and valleys. (cf. plateau, cuesta)

### metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the

earth's crust. Nearly all such rocks are crystalline. (Example: schist, gneiss, quartzite)

metastable slope

A slope that is relatively stable at the present time, but may become active if the environmental balance is disturbed, for instance, by road construction or destruction of vegetation. A metastable slope is often related to base levels of former geomorphic episodes. The regolith is generally moderately deep, may contain stone lines, or relict evidence of slope alluvium. Slope gradients usually range from 15 to 45 percent. (cf. active slope)

mima mound

A term used in the Pacific NW for one of numerous, low, circular or oval domes composed of loose, unstratified, gravelly silty and sandy material built upon glacial outwash. (cf. patterned ground)

monocline

A unit of folded strata that flexes from the horizontal in one direction only, and is not part of an anticline or syncline. This structure is typically present in plateau areas where nearly flat strata locally assume steep dips to differential vertical movements without faulting.

moraine (general)

An accumulation of drift, with an initial topographic expression of its own, built chiefly by the direct action of glacial ice. Examples are end, ground, lateral, recessional, and terminal moraines. (cf. glacial till)

moraine (end)

A moraine produced at the front of an actively flowing glacier at any given time. (cf. terminal and recessional moraines)

moraine (ground)

An extensive, fairly even and thin layer of till, having an undulating surface; a deposit of rock debris dragged along, in, on and beneath a glacier and emplaced by processes including basal lodgement and release from downwasting stagnant ice (by ablation).

moraine (lateral)

A ridge-like moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from valley walls by glacial abrasion and plucking, or mass-wasting.

moraine (recessional)

An end moraine, built during a temporary but significant halt in the final retreat of a glacier.

moraine (terminal)

An end moraine that marks the farthest advance of a glacier and usually has the form of a massive arcuate ridge, or complex of ridges, underlain by till and other drift types.

mountain

A natural elevation of the land surface, rising more than 1,000 ft (300 m) above surrounding lowlands, usually of restricted summit area (relative to a plateau), and generally having steep sides ( $>25\%$  slope) and considerable bare-rock surface. A mountain can occur as a single, isolated mass, or in a group forming a chain or range. Mountains are primarily formed by deep seated earth movements and/or volcanic action and secondarily by differential erosion. (cf. hill)

mudflow

(cf. debris flow)

muskeg

A bog with deep accumulations of organic matter growing in poorly drained areas; a moss covered muck or peat bog of boreal regions.

natural levee

(cf. meander belt)

nuee ardente

A swiftly flowing and turbulent gaseous cloud, sometimes incandescent, erupted from a volcano and containing ash and other pyroclastics in its lower parts which is comparable to an "ash flow". (Syn. glowing avalanche, ash flow)

nunatak

An isolated hill, knob, or ridge of bedrock that projects prominently above the surface of a glacier and is surrounded by glacial ice; a hill or peak that was surrounded, but not overridden by glacial ice. (Syn. rognon)

outwash plain

An extensive lowland area forming the surface of a body of coarse textured, glaciofluvial material. An outwash plain is commonly smooth; where pitted, due to melt-out of incorporated ice masses, it is generally low in relief. (cf. glacial outwash, kettles)

oxbow

(cf. meander belt)

pahoehoe

A type of lava flow having a glassy, smooth, or undulating surface.

paleosol

A soil with distinctive morphological features (color, structure, etc. that may be consistently described) that formed on a landscape of the past (Ruhe) resulting from a soil-forming environment that no longer exists at the site. The former pedogenic process was either altered because of external environmental change or interrupted by burial. A paleosol (or component horizon) may be classed as relict if it has persisted in a land-surface position without major alteration of morphology by processes of the prevailing pedogenic environment. An exhumed paleosol is one that formerly was buried and has been re-exposed by erosion of the covering mantle. Most paleosols have been affected by some modification of diagnostic-horizon morphologies and profile truncation.

palsen

Small earth mounds (hummocks) believed to be of periglacial origin in arctic and alpine regions, and that persist long after amelioration of the climatic conditions that produced them. (cf. patterned ground, pl. of palsa)

parallel drainage pattern

A drainage pattern in which the streams and their tributaries are regularly spaced and flow nearly parallel or subparallel to one another. It is indicative of a region having a pronounced, uniform slope and a homogeneous lithology and rock structure.

patterned ground

A term for the more or less symmetrical forms such as circles, polygons, nets, stripes, garlands, and steps that are characteristic of, but not confined to, mantles subjected to intense frost action as in periglacial environments. Stone polygons generally form on slopes of less than 8 percent, while garlands and stripes occur on slopes of 8-15 percent and more than 15 percent, respectively (Parsons and Herriman, 1976). "Fossil patterned ground" is now inactive, and is a relict of the colder periods during the Pleistocene when a region was under periglacial conditions.

peak

Sharp or rugged upward extension of a ridge chain, usually at the junction of two or more ridges; the prominent highest point of a summit area.

pediment

A gently sloping erosional surface developed at the foot of a receding hill or mountain slope. The surface may be essentially bare, exposing earth material that extends beneath adjacent uplands; or it may be thinly mantled with alluvium and colluvium, ultimately in transit from upland front to basin or valley lowland. (In hill-footslope terrain the mantle is designated "pedisediment" by Ruhe). The term has been used in several geomorphic contexts: Pediments may be classed with respect to (1) landscape position, for example intermontane-basin piedmont or valley-border footslope surfaces (respectively, apron and terrace pediments of Cooke and Warren), (2) type of material eroded, bedrock or regolith, or (3) combinations of the above.

periglacial

Pertaining to processes, conditions, areas, climates, and topographic features occurring at the immediate margins of former and existing glaciers and ice sheets, and influenced by cold temperature of the ice. The term was originally introduced to designate the climate and related geologic features peripheral to ice sheets of the Pleistocene. It has been loosely defined to include frost-action effects and loess deposits that may or may not be related to glaciers.

piedmont slope

The dominant gentle slope at the foot of a mountain; generally used in terms of intermontane-basin terrain in arid to subhumid regions. Main components include: (1) an erosional surface on bedrock adjacent to the receding mountain front (pediment); (2) a constructional surface comprising individual alluvial fans and interfan valleys, also near the mountain front; and (3) a distal complex of coalescent fans (bajada), and alluvial slopes without fan form. Piedmont slopes grade to either basin-floor depressions with alluvial and temporary lake plains or surfaces of through drainage. (cf. bolson)

pingo

A large frost mound; esp. a relatively large conical mound of soil covered ice (commonly 30-50 m high and 400 m in diameter) raised by hydrostatic pressure of water within or below permafrost, and of more than one-year duration.

plain

An extensive lowland area that ranges from level to gently sloping or undulating. A plain has few or no prominent hills or valleys, and occurs at low elevation with reference to surrounding areas (local relief generally less than 100 m. (cf. plateau).

plateau

An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 m) above adjacent lowlands, and is separated from them on one or more sides by escarpments. A comparatively large part of a plateau surface is near summit level. (cf. mesa, plain)

playa

The usually dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those occurring on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation-runoff events. Playa deposits are fine grained and may or may not be characterized by a high water table and saline conditions.

Pleistocene

The first epoch of the Quaternary Period of geologic time, (approx. from 2 million to 10 thousand years ago); following the Tertiary Pliocene Epoch

and preceding the Holocene; also the corresponding (time-stratigraphic) "series" of earth materials. Glacial-interglacial stage/age subdivisions in North America include, in order of increasing age, Wisconsinan-Sangamonian, Illinoian-Yarmouthian, Kansan-Aftonian, and Nebraskan. (syn. glacial epoch, Ice Age)

#### Pliocene

The last epoch of the Tertiary Period of geologic time, (approx. 7 to 2 million years ago) following the Miocene Epoch and preceding the (Quaternary) Pleistocene Epoch; also the corresponding (time-stratigraphic) "series" of earth materials.

#### plutonic

Pertaining primarily to igneous rocks formed deep in the earth's crust, but also including associated metamorphic rocks.

#### pluvial lake

A lake formed in a period of exceptionally heavy rainfall; a lake formed in the Pleistocene epoch during a time of glacial advance, and now either extinct or existing as a remnant. (Example: Lake Bonneville, cf. periglacial)

#### pyroclastic

Pertaining to fragmental materials produced by usually explosive, aerial ejection of clastic particles from a volcanic vent. Such materials may accumulate on land or under water. (cf. epiclastic, volcaniclastic)

#### Quaternary

The second period of the Cenozoic Era of geologic time, extending from the end of the Tertiary Period (about 2 million years ago) to the present and comprising two epochs, the Pleistocene (Ice Age) and the Holocene (Recent); also the corresponding (time-stratigraphic) "system" of earth materials.

#### radial drainage pattern

A drainage pattern in which streams radiate or diverge outward, like the spokes of a wheel, from a high central area, such as a volcanic cone.

#### ravine

A small stream valley; narrow, steep-sided, and commonly V-shaped in cross section; and larger than a gully. (general syn. gulch; cf. draw)

**regolith**

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock, and alluvial, glacial, eolian, lacustrine and pyroclastic deposits. Soil scientists regard soil as only that part of the regolith that is modified by organisms and other soil-forming forces. Most engineers describe the whole regolith, even to a great depth, as "soil." (cf. residuum)

**relict**

Pertaining to surface landscape features (e.g., landforms, geomorphic surfaces, paleosols) that have never been buried and are products of past environments no longer operative in a given area. (cf. exhumed)

**relief**

The elevations or inequalities of a land surface, considered collectively.

**residuum (residual material)**

Unconsolidated, weathered, or partly weathered mineral material that is presumed to have accumulated by disintegration of bedrock in place, without movement or additions of sediment. (cf. saprolite, regolith)

**ridge**

A long, narrow elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys. The term is used in areas of both hill and mountain relief (less and greater than 300 m).

**rim**

The border, margin, or edge of a landform, such as the curved rim around the top of a crater or caldera; the rimrock of a plateau or canyon.

**riser**

The vertical or steeply sloping surface of one of a series of natural step-like landforms, as those of successive stream terraces. (cf. tread)

**saddle**

A low point on a ridge or crestline, generally a divide (pass, col) between the heads of streams flowing in opposite directions.

salt marsh

Flat, poorly drained land that is subject to periodic or occasional overflow by salt water, by high tides or storms, containing water that is brackish or strongly saline, and usually covered by a thick mat of grassy halophytic plants; or an inland marsh in an arid region and subject to intermittent overflow by water with a high salt content.

saprolite

Soft, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil science, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below. (cf. residuum)

scabland

An elevated, flatlying, bedrock-floored land, with little, if any, soil cover, sparse vegetation, and usually deep, dry channels (channeled scabland) scoured into the surface, esp. by glacial meltwaters.

scree

A heap of rock waste at the base of a cliff or a sheet of coarse debris mantling a slope. Scree is not a synonym of talus, as scree also includes loose material on slopes without cliffs.

sea cliff

A cliff or slope produced by wave erosion, located at the seaward edge of the coast, and marking the inner limit of beach erosion. A sea cliff may vary from a gentle slope to a high, steep escarpment.

sediment

Solid clastic material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice or mass-wasting and has come to rest on the earth's surface either above or below sea level. Sedimentary deposits in a broad sense also include materials precipitated from solution or emplaced by explosive volcanism, as well as organic remains (e.g., peat) that have not been subject to appreciable transport.

**sedimentary rock**

A consolidated deposit of clastic particles, chemical precipitates and organic remains accumulated at or near the surface of the earth under "normal" low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, glacial drift, and eolian, lacustrine and marine deposits (e.g., sandstone, siltstone, mudstone, claystone, and shale, conglomerate and limestone, dolomite, coal, etc.; cf. sediment).

**semibolson**

A wide desert basin or valley that is drained by an intermittent stream that reaches a surface outlet, such as another stream, a lower basin, or the sea; its central playa is poorly developed or absent. (cf. bolson)

**sheetflood (sheetwash)**

A broad expanse of moving, storm-borne water that spreads as a thin, continuous, relatively uniform film over a large area in an arid region and that is not concentrated into well defined channels; its duration is brief and distance of flow is short.

**shield volcano**

A volcano in the shape of a flattened dome, broad and low, built by flows of very fluid, basaltic lava. (cf. stratovolcano)

**shoulder (hillslope)**

The geomorphic component that forms the uppermost inclined surface at the top of a hillslope. It comprises the transition zone from backslope to summit of an upland. The surface is dominantly convex in profile and erosional in origin.

**sinkhole**

A closed depression formed either by solution of the surficial bedrock (e.g., limestone, gypsum, salt) or by collapse of underlying caves. Complexes of sinkholes in carbonate-rock terranes are the main components of karst topography. (syn. doline)

**slope alluvium**

Sediment gradually transported on mountain or hill slopes primarily by alluvial processes and characterized by particle sorting. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of coarse fragments and may be separated by stone lines. Sorting

of rounded or subrounded pebbles or cobbles, and burned peds contrast with unsorted colluvial deposits.

slopewash

(cf. valley side alluvium)

slough

A small marsh, especially a marshy tract lying in a swale or other shallow undrained depression on an area of dry land; a dry depression that becomes marshy or filled with water.

slump

The downward slipping of a mass of rock or unconsolidated material of any size, moving as a unit or as several subsidiary units, usually with backward rotation on a more or less horizontal axis parallel to the cliff or slope from which it descends.

solifluction

Slow viscous downslope flow of water saturated regolith; especially the mass-wasting process occurring in areas of frozen ground, with alternate freezing and thawing of surficial materials.

solifluction lobe

An isolated tongue-shaped mass of solifluction debris commonly with a steep front and a relatively gentle upper surface.

spit

A small point of land commonly consisting of sand or gravel deposited by longshore drifting and having one end attached to the mainland and the other terminating in open water, usually the sea.

spur

A secondary divide between minor drainage systems of an area, that generally has an inverted "V" shape, and occurs considerably below the elevation of the associated ridge.

**stack**

A small, lofty, isolated, commonly steep-sided, pillar-like rocky island or mass detached from a headland by wave erosion assisted by weathering.

**steptoe**

An island-like area in a lava flow. (Syn. kipuka)

**stone line**

A sheet-like concentration of coarse fragments in surficial sediments. In cross-section, the line may be marked only by scattered fragments or it may be a discrete layer of fragments. The fragments are more often pebbles or cobbles than stones. A stone line generally overlies material that was subjected to weathering, soil formation, and erosion before deposition of the overlying material. Many stone lines seem to be buried erosion pavements, originally "formed by running water on the land surface and concurrently covered by surficial sediment" (Ruhe).

**stone net**

(cf. patterned ground) Syn. sorted polygon, stone polygon.

**strath terrace**

(cf. stream terrace)

**stratified**

Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

**stratigraphy**

The branch of geology that deals with the definition and interpretation of stratified earth materials; the conditions of their formation; their character, arrangement, sequence, age, and distribution; and especially their correlation by the use of fossils and other means. The term is applied both to the sum of the characteristics listed and a study of these characteristics.

### **stratovolcano**

A volcano that is constructed of alternating layers of lava and pyroclastics. (cf. shield volcano)

### **stream order**

In a drainage basin network, the smallest unbranched tributaries are designated order 1; the confluence of two first-order streams produces a stream segment of order 2; the junction of two second-order streams produces a stream segment of order 3; etc. The order of the drainage basin is determined by the highest integer.

### **stream terrace**

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, stream bed, or valley floor produced during a former stage of erosion or deposition. Erosional surfaces cut on bedrock and thinly mantled with stream deposits (alluvium) are designated "strath terraces." Remnants of constructional valley floors are termed "alluvial terraces." (cf. terrace)

### **structural bench (or bench)**

A platform-type, nearly level to gently inclined erosional surface developed on resistant strata in areas where valleys are cut in alternating strong and weak layers with an essentially horizontal attitude. Structural benches, in contrast to stream terraces, have no geomorphic implication of former, partial erosion cycles and base-level controls, nor do they represent a stage of flood-plain development following an episode of valley trenching.

### **summit**

A general term for the top, or highest level of an upland feature such as a hill, mountain, or tableland. It usually refers to a high interfluve area of lower slope that is flanked by steeper sideslopes (e.g., hillslopes, mountain fronts, or tableland escarpments). Summit areas may or may not include distinct crest lines or high points that rise above their general level.

### **swamp**

An area intermittently or permanently covered with water, having shrubs and trees but essentially without the accumulation of peat.

**swell-and-swale topography**

Topography of ground moraine having low relief, gentle slopes, and well rounded hills interspersed with shallow depressions.

**syncline**

A unit of folded strata that is concave upward. In a simple syncline, beds forming the opposing limbs of the fold dip toward its axial plane. (cf. anticline, monocline)

**tableland**

A general term for a broad upland mass with nearly level or undulating summit area of large extent and steep sideslopes descending to surrounding lowlands. Varieties include plateaus, and mesas.

**talus**

Rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding. (cf. colluvium, mass wasting, scree)

**tank**

Natural depressions in an impervious stratum in which water collects.

**tephra**

A collective term for all clastic volcanic materials which are ejected from a vent during an eruption and transported through the air, including volcanic ash, cinders, lapilli, scoria, pumice, bombs, and blocks. (syn. volcanic ejecta)

**terrace (geomorphic)**

A step-like surface, bordering a valley floor or shoreline, that represents the former position of an alluvial plain, fan, or lake or sea shore. The term is usually applied to both the relatively flat summit surface (platform, tread), cut or built by stream or wave action, and the steeper descending slope (scarp, riser), graded to a lower base level of erosion. (cf. stream terrace)

**terracettes**

Small, irregular step-like forms on steep slopes, especially in pasture, formed by creep of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle. (syn. catsteps, soil ripples)

**terrain**

The physical features of an area or region.

**terrane**

An obsolete term for the area or surface over which a particular rock or group of rocks is prevalent.

**Tertiary**

The first period of the Cenozoic Era of geologic time, following the Mesozoic Era preceding the Quaternary (approx. from 65 to 2 million years ago); also the corresponding time-stratigraphic subdivision (system) of earth materials. Epoch/series subdivisions comprise, in order of increasing age, Pliocene, Miocene, Oligocene, Eocene, and Paleocene.

**thermokarst lake**

A lake (or pond) produced in a permafrost region by melting of ground ice.

**tidal flat**

An extensive, marshy or barren tract of land that is covered and uncovered by the rise and fall of the tide.

**till plain**

An extensive flat to undulating area underlain by glacial till. (cf. glacial till, moraine-ground)

**toeslope**

The geomorphic component that forms the outermost, gently-inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle

and linear; and in terms of gradational processes, they are constructional surfaces forming the distal part of a hillslope continuum that grades to valley or closed-depression floors. (cf. footslope, valley floor)

tombolo

A sand or gravel bar, or spit, that connects an island with the mainland or with another island.

topography

The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

tor

An isolated craggy pinnacle or rocky peak, much jointed and usually granitic, exposed to considerable weathering, and often assuming peculiar shapes; periglacial processes may be important in tor formation.

tread

The flat or gently sloping surface of step-like landforms, as those of successive stream terraces. (cf. riser)

underfit stream

A stream that appears to be too small to have eroded the valley in which it flows; it is a common result of drainage changes effected by capture, by glaciers, or by climatic variations.

upland (geomorphology)

Land at a higher elevation, in general, than the alluvial plain or low stream terrace; land above the footslope zone of the hillslope continuum.

valley

An elongate, relatively large, externally-drained depression that is primarily developed by stream erosion. (cf. basin-intermontane)

valley-border surfaces

A general grouping of valley-side geomorphic surfaces that occur in a stepped sequence graded to successively lower stream base levels produced by episodic valley entrenchment.

valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, mass wasting) so as to fill or partly fill a valley.

valley flat (flood-plain landform)

A general term for broad, nearly level flood-plain surfaces that are not subject to frequent inundation. (cf. backswamp, meander belt)

valley floor

A general term for the nearly level to gently sloping, bottom surface of a valley. Component landforms include axial stream channels, the flood plain, and in some areas, low terrace surfaces that may be subject to flooding from tributary streams. (cf. flood-plain landforms, meander, braided channel, valley side)

valley side (valley wall)

The sloping to very steep surfaces between the valley floor and summits of adjacent uplands. Well-defined, steep valley sides may be termed "valley walls." NOTE: Scale, relief, and perspective may require use of closely related terms such as hillslope, mountain slope, and ridge side.

valley side alluvium

A concave "slopewash" deposit at the base of a hillslope, mountain slope, terrace escarpment, etc. that may or may not include the alluvial toeslope of a pediment.

valley train

A long narrow body of glacial outwash confined within a valley below a glacier; it may, or may not, emerge from the valley and join an outwash plain.

varve

A sedimentary layer, lamina or sequence of laminae, deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**ventifact**

A stone or pebble shaped, worn, polished, or faceted by the abrasive, sandblast action of windblown sand.

**volcanic**

Pertaining to (1) the deep-seated (igneous) processes by which magma and associated gases rise through the crust and are extruded onto the earth's surface and into the atmosphere, and (2) the structures, rocks, and landforms produced. (cf. extrusive)

**volcanic cone**

A conical hill of lava and/or pyroclastics that is built up around a volcanic vent.

**volcaniclastic**

Pertaining to the entire spectrum of fragmental materials with a preponderance of clasts of volcanic origin. The term refers not only to pyroclastic materials but also to epiclastic deposits derived from volcanic source areas by normal processes of mass wasting and stream erosion. (Examples: welded tuff, volcanic breccia)

**wash (dry wash)**

The broad, flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium. NOTE: When channel reaches intersect zones of ground-water discharge they are more properly classed as "intermittent stream" channels. (syn. arroyo)

**wave-cut platform**

A gently sloping surface produced by wave erosion, extending into the sea or lake from the base of the wave-cut cliff. It represents both the wave-cut bench and the abrasion platform, and is often mantled with younger sediments in which soils have formed.

**weathering**

All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents with essentially no transport of the altered material. These changes result in disintegration and decomposition of the material. (cf. regolith, residuum, saprolite)

wind gap

A former water gap now abandoned by the stream that formed it, suggesting stream piracy or stream diversion.

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\*Denotes books that would be useful in field office libraries.

## Approximate correlation of stratigraphic units.





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